



NOTE

Surgery

Primary intrapelvic hemangiosarcoma in a dog

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ABSTRACT. A 12-year-old, spayed female Schnauzer presented with constipation. A mass was observed in the pelvic cavity, and metastasis was not identified. Mass resection was performed through celiotomy with pubic osteotomy, and hemangiosarcoma was diagnosed. At 10 weeks post-operatively, the patient died of multiple metastasis. Primary intrapelvic hemangiosarcoma is rare in dogs.

KEY WORDS: dog, hemangiosarcoma, intrapelvic, neoplasia

Hemangiosarcoma (HSA) is a malignant tumor of endothelial cells characterized by aggressive metastasis and a high case-fatality rate [1, 2, 8]. The mean age at diagnosis is 9–12 years. No sex or breed predilection has been proven; however, German Shepherd dogs, Golden Retrievers, Labrador Retrievers and Schnauzers are predisposed to this condition [2, 10]. HSA could affect any tissue in the body, with the most common primary sites being the spleen, right atrium, right auricle, skin or subcutaneous tissue [1, 2, 8]. The most common sites of metastasis are the liver, omentum, mesentery and lungs, which occur either hematogenously or through seeding after tumor rupture [1].

Diagnosis of HSA through histopathology is possible by comparing vasoformative components, but poorly differentiated HSA may resemble anaplastic carcinomas, malignant melanomas or high-grade malignant fibrohistiocytic tumors [4]. Additional immunohistochemistry is helpful in diagnosing HSA, which is commonly expressed for endothelial cell markers, such as vimentin, von Willebrand's factor (vWF; factor VIII-related antigen) and CD31 antigen [3, 10, 13]. In this case report, we present a case of intrapelvic hemangiosarcoma in a Schnauzer.

A 12-year-old, spayed female Schnauzer was referred to Konkuk Veterinary Medical Teaching Hospital with a week's history of constipation. Upon physical examination, abdominal distention was observed, and a mass was rectally palpated in the pelvic cavity. Blood examination and thoracic radiography yielded no remarkable findings. Abdominal radiography revealed megacolon and splenomegaly, and the rectum was displaced laterally in the pelvic cavity (Fig. 1). Fine-needle aspiration biopsy of the mass revealed cells of mesenchymal origin, binucleated cells and extracellular eosinophilic granules. On ultrasonography, an encapsulated, irregular mass with multiple cavities with low vascularity was observed (Fig. 2). On computed tomography, a non-contrast-enhancing, heterogeneous soft-tissue mass of approximately 4.8 × 4.1 × 2.5 mm, occupying the pelvic inlet, was visualized on contrast-enhanced coronal images, and the rectum was observed to be suppressed and displaced laterally by the mass in the pelvic cavity (Fig. 3). Because no obvious signs of metastasis were identified, the owners opted for surgical intervention.

The dog was premedicated with 0.2 mg/kg butorphanol (Butophan; Myungmoon Pharm, Seoul, Korea) and 0.3 mg/kg midazolam (Vascam; Hana Pharm, Gyeonggi-do, Korea), intravenously. Anesthesia was induced with 6 mg/kg propofol (Provive Inj. 1%; Claris Life Science, Ahmedabad, India) and maintained with isoflurane (Ifran Liq; Hana Pharm). Resection of the mass was performed through celiotomy with pubic osteotomy. The mass was solitary near the rectum and was encapsulated by a fibrous tissue, but the origin could not be identified; therefore, the mass was retracted softly using Babcock forceps and separated with a wide margin using an electric coagulator. The pubic bone and obturator muscle were reapposed with simple, interrupted silk sutures (Black silk, 2–0; AILEE Co., Ltd., Busan, Korea) and polyglyconate (2–0; Syneture™, Maxon, Seoul, Korea), respectively. The linea alba, subcutaneous tissue and skin were closed using routine suturing. One day postoperatively, the patient could void

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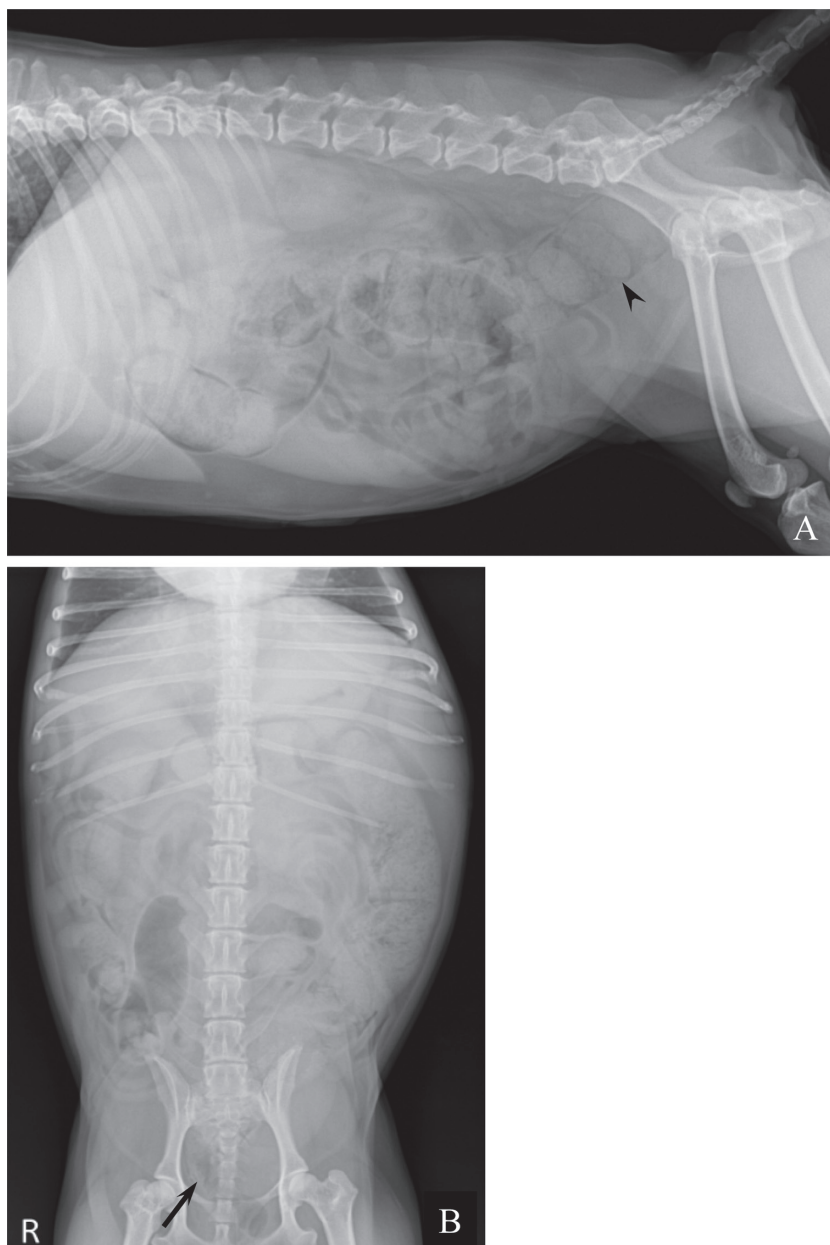


Fig. 1. Abdominal radiography. A. Lateral view. Gas-filled and enlarged colon (arrow head). B. Ventrodorsal view. Laterally displaced rectum in the pelvic cavity (arrow).

spontaneously, and 1 week postoperatively, the patient could walk and defecate.

On gross examination, the resected mass was firm and stationary. Cross-sectioning of the mass revealed multiple cavities filled with blood. Histopathological investigation was initiated. Microscopically, the fibrous connective tissue capsule was revealed along the border, and hemorrhagic and necrotic areas were observed (Fig. 4A). Several areas of viable cells that were polyhedral and distinct, with moderate amounts of pale eosinophilic cytoplasm, were present. Round/ovoid to irregularly contoured nuclei, anisokaryosis, anisocytosis and mitosis were observed (Fig. 4B). Additional immunohistochemical staining was positive for vimentin, vWF and CD31, and negative for cytokeratin, which supported the diagnosis of HSA (Fig. 4C and 4D).

Chemotherapy was not performed, by the owner's choice. At 5 weeks after discharge, a nodular interstitial pattern was observed upon thoracic radiography. At 10 weeks post-operatively, the dog was again admitted for seizure, and blindness of the left eye was observed upon physical examination. Nodules in the spleen were confirmed through ultrasonography, but no recurrence was seen at the surgical site. Anticonvulsant, antibiotics and anti-inflammatory drugs were administered. The patient died 5 days after occurrence of the seizures.

On post-mortem microscopic examination, multiple sections of the lung, brain and spleen were examined, and evidence of tumor was identified in each of these structures. The cells of the lung were angioblastic and endothelial in appearance, with indistinct cell borders, and were characterized by a scant to moderate cytoplasm, with hyperchromatic ovoid to elongated nuclei

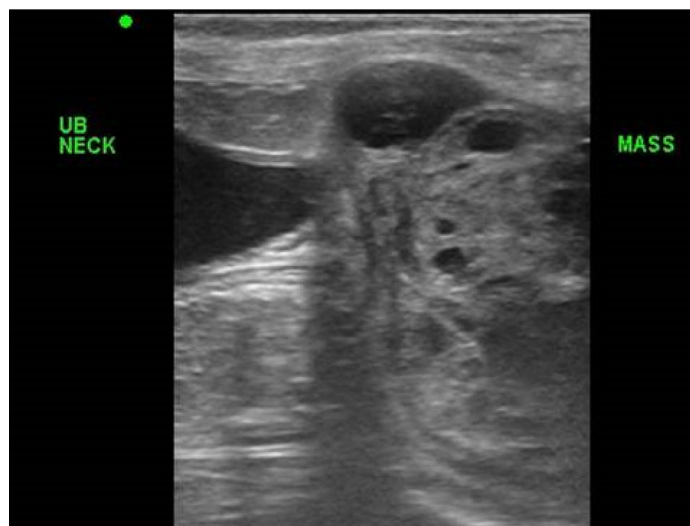


Fig. 2. Ultrasonography. An encapsulated, irregular mass with heterogeneous echogenicity.

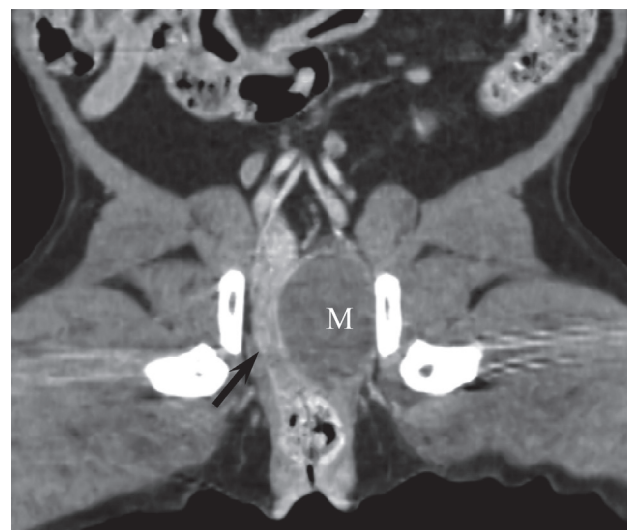


Fig. 3. Coronal image of computed tomography. Non-contrast-enhancing, heterogeneous soft-tissue mass (M) occupying the pelvic inlet. Laterally displaced rectum in the pelvic cavity (arrow).

and variable numbers of nucleoli. Tumor cells formed bundles, clefts or irregular cavernous structures, which contained scant to moderate amounts of blood and fibrin debris. Hemorrhage and focal thrombosis were apparent (Fig. 5A). Metastatic HSA was also identified within several brain areas, including the right cerebellar hemisphere, midbrain and left cerebral cortex. Metastatic foci were accompanied by significant hemorrhage, particularly in the brain (Fig. 5B and 5C). Similar neoplastic populations were identified in spleen tissue, again accompanied by significant hemorrhage. The red pulp contained ample hemosiderin-laden macrophage populations, along with areas of hematopoiesis. Multiple metastases of HSA were confirmed through histopathology and immunohistochemistry, using anti-CD31 and α -vWF antibodies.

The retroperitoneal space is a complex potential space that extends cranially to the diaphragm, caudally to the anus, dorsally to the sublumbar muscles and ventrally to the peritoneal surface of the abdomen [5, 7]. Neoplasia of the retroperitoneal space rarely occurred, but has been reported to include hemangiosarcoma, osteosarcoma, leiomyosarcoma and hemangiopericytoma [7]. Intrapelvic regions are included in the retroperitoneal space, but a single case of an intrapelvic hemangiosarcoma has been reported only in a horse [6].

Malignant intrapelvic masses are reported to have a heterogeneous post-contrast architecture, because malignant tumors rapidly outgrow existing vasculature, leading to regions of necrosis [12]. In the present case, the intrapelvic mass appeared to be heterogeneous on CT images, but the mass was encapsulated and no invasive vasculature was noted. Moreover, on post-contrast CT examination, the mass did not show contrast enhancement without the capsule. There were no distant metastases to the lymph nodes or other organs on ultrasonography or CT images. Therefore, surgical resection of the mass was chosen to increase the quality of life of the patient, and to confirm a diagnosis and prevent metastasis.

Reported origins of intrapelvic masses include rectal, neural, glandular, vascular or adipose tissue [12]. During surgical observation, the mass appeared to not be connected with the rectum or pelvic bone, but showed connection with a vessel. Therefore, the mass may have originated from the paravertebral vasculature.

HSA is of endothelial origin, but is a poorly differentiated mesenchymal tumor. The histological morphology of HSA cells is highly heterogeneous, with polygonal, ovoid or spindle-shaped cells, and the growth patterns range from vasoformative to solid. On the other hand, hemangioma cells have minimal anisokaryosis, a low mitotic rate, and are more differentiated than HSA [9, 10]. Immunohistochemical staining could be of value in making the diagnosis HSA [4, 9, 10, 13]. vWF has traditionally been used as a neoplastic endothelial cell marker [4, 10], and CD31 antigen is a more specific marker for HSA; this protein is also called platelet endothelial cell adhesion molecule and participates in the adhesion between platelets and endothelial cells [3, 10]. These markers are not present in fibrosarcoma, schwannoma, hemangiopericytoma and leiomyosarcoma [3, 13]. In the present case, HSA was suspected based on histology, and the positive immunohistochemical staining for vimentin, cytokeratin and CD31 in the mass found in the intrapelvic region strongly supported that the mass was HSA.

HSA can metastasize anywhere blood vessels exist. In a previous study, a secondary metastasis arose from the CNS in 14.2% of dogs with HSA. The cerebral cortex and the cerebellum are the most common metastatic locations in the brain. A change in mentation, seizure, polyuria–polydipsia and vestibular dysfunction are common clinical signs in dogs with brain HSA metastasis [11]. Our case presented with seizure and blindness of the left eye. On histopathological examination, metastatic HSA cells were revealed in the cerebrum and the cerebellum of multiple sections of the brain.

In conclusion, in the case presented here, HSA arose in the pelvis and was surgically resected with a wide margin, but the

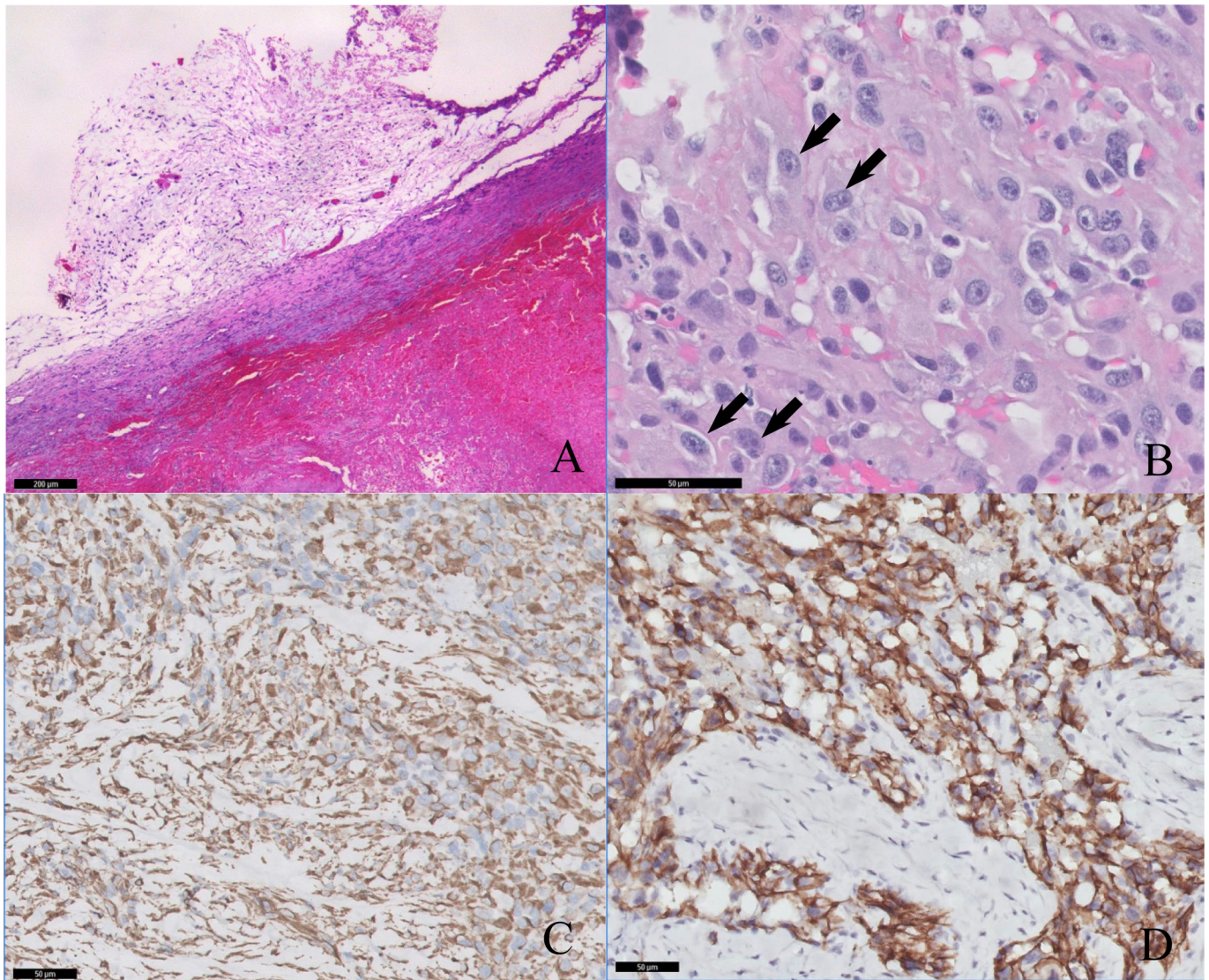


Fig. 4. Histopathological investigation of the intrapelvic mass. A. Hemorrhagic and necrotic areas along the border. Staining: hematoxylin and eosin (H&E; ×50; Scale bar=200 μm). B. Malignancy indices, including anisokaryosis, and multiple nucleoli (arrows) (H&E; ×400; Scale bar=50 μm). C. Positive staining of vimentin (vimentin immunohistochemical staining; ×200; Scale bar=50 μm). D. Positive staining of CD31 (CD31 immunohistochemical staining; ×200; Scale bar=50 μm).

dog died 10 weeks post-operatively with multi-organ metastasis. To the best of our knowledge, this is the first report of primary intrapelvic hemangiosarcoma in a dog.

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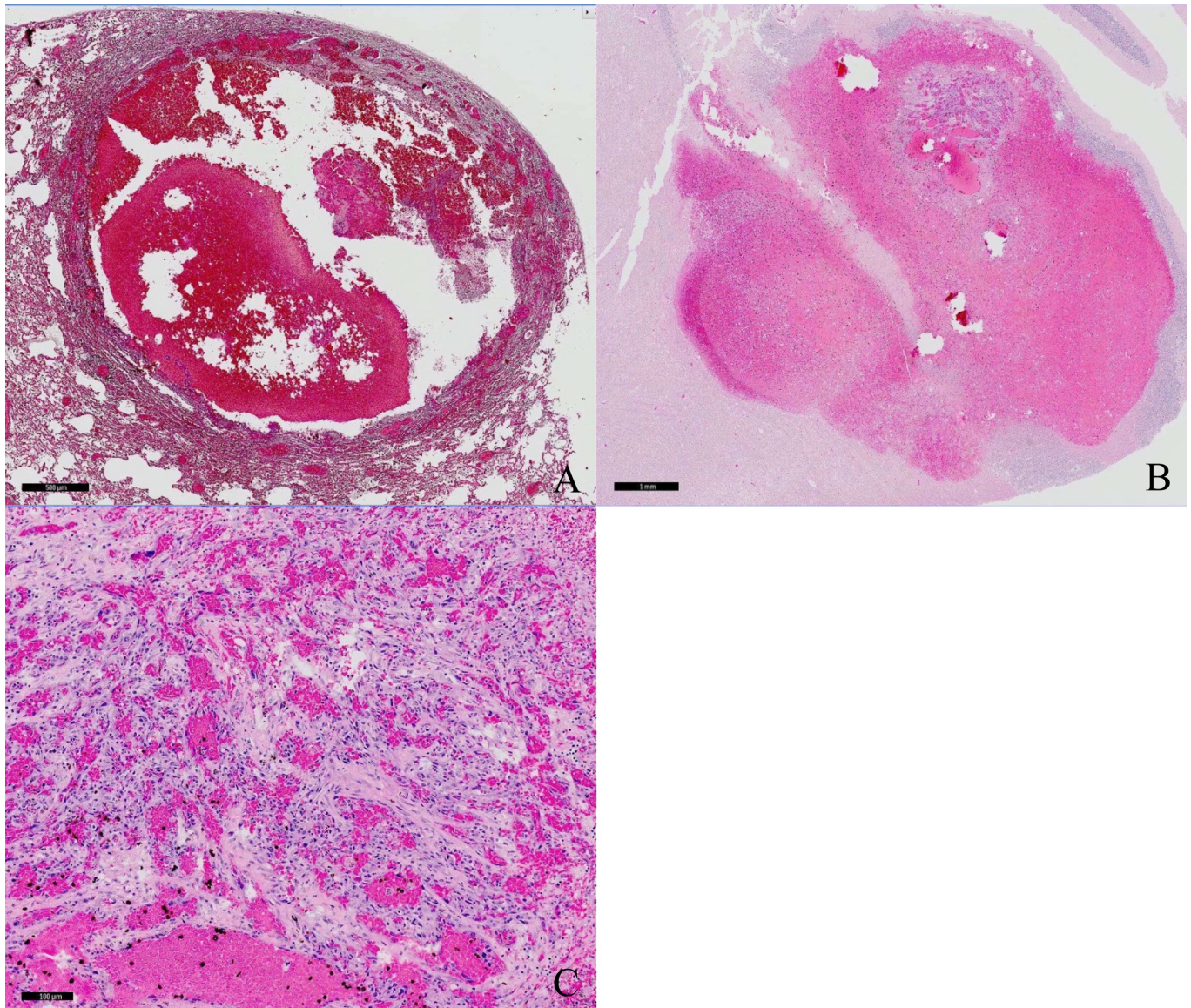


Fig. 5. Histopathological examination of the metastatic organs. A. Lung metastasis. A thick and enlarged vascular channel with neoplastic endothelial cells (H&E; $\times 20$; Scale bar=500 μm). B. Cerebellum metastasis. Significant focal hemorrhage and necrosis (H&E; $\times 10$; Scale bar=1,000 μm). C. Cerebellum metastasis. Neoplastic endothelial cells forming irregular vascular channels (H&E; $\times 100$; Scale bar=100 μm).

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